CLAIMS

1.   A block distortion detection apparatus for
detecting a block distortion occurred during block
encoding of an image, comprising:

5   an edge detection means for detecting an existence
of an edge in each of a plurality of pixel signals based
on differences of each of successive pixel signals;

an edge count means including a plurality of
counters, a number of which is determined in response to

10 a number of pixels included in a block, for successively
accepting and counting edge detection results of said
edge detection means respectively by said plurality of
counters at first timing, which is synchronized with a
horizontal synchronization signal; and

15   a block boundary identification means for
successively retrieving counter values of said plurality
of counters at second timing, which is synchronized with
a vertical synchronization signal, and for identifying a
block boundary based on the counter values of the

20 counters and an order of retrieving the edge detection
results by the respective counters.

2.   A block distortion detection apparatus as set forth
in claim 1, wherein said edge count means resets the
counters at said second timing.

25 3.   A block distortion detection apparatus as set forth

in claim 2, wherein:

said edge detection means successively retrieves pixel signals for successive "n" times (n: an integer) and successively calculates (n-1) number of difference

5   absolute values of adjacent pixel signals; and

when assuming that a difference absolute value positioned at the center as a focused difference absolute value among said (n-1) number of difference absolute values;

10   when difference absolute values except for said focused different absolute value are not larger than a predetermined value, and

said focused difference absolute value is a predetermined multiple of an average of the difference

15   absolute values except for said focused different absolute value or larger,

an existence of an edge existing between pixel signals having said focused difference absolute value is detected.

20   4.   A block distortion detection apparatus as set forth in claim 2, wherein:

said edge detection means successively retrieves pixel signals for successive "n" times (n: an integer) and successively calculates (n-1) number of difference

25   absolute values of adjacent pixel signals; and

when assuming that a difference absolute value

positioned at the center as a focused difference absolute

value among said (n-1) number of difference absolute

values, and

5   when said focused different absolute value is a

value within a predetermined range

an existence of an edge existing between pixel

signals having said focused difference absolute value is

detected.

10   5.   A block distortion detection apparatus as set forth

in claim 2, wherein:

said edge detection means successively retrieves

pixel signals for successive "n" times (n: an integer)

and successively calculates (n-1) number of difference

15   absolute values of adjacent pixel signals; and

when assuming that a difference absolute value

positioned at the center as a focused difference absolute

value among said (n-1) number of difference absolute

values;

20   when difference absolute values except for said

focused different absolute value are not larger than a

predetermined value,

said focused difference absolute value is a

predetermined multiple of an average of the difference

25   absolute values except for said focused different

absolute value or larger, and

said focused different absolute value is a value

within a predetermined range,

an existence of an edge existing between

5   pixel signals having said focused difference absolute

value is detected.

6.   A block distortion detection apparatus as set forth

in claim 2, wherein the number of the plurality of

counters of said edge count means is a multiple of "N"

10   when said block encoding is performed in units of blocks

in N pixels by N pixels.

7.   A block distortion detection apparatus as set forth

in claim 6, wherein:

said block boundary identification means retrieves

15   counter values of respective counters by following a

retrieving order of said plurality of counters and

rearranges the counter values in an ascending order; and

when each of said counters counts up when an edge

exists, and a difference of retrieving orders is "N" in

20   two counters having the largest and second largest

counter values,

a horizontal position corresponding to said two

counters is identified as a block boundary position.

8.   A block distortion detection apparatus as set forth

25   in claim 6, wherein:

said block boundary identification means retrieves

counter values of respective counters by following a

retrieving order of said plurality of counters and

rearranges the counter values in an ascending order; and

5   when each of said counters counts down when an edge

exists, and a difference of retrieving orders is "N" in

two counters having the smallest and second smallest

counter values,

a horizontal position corresponding to said two

10   counters is identified as a block boundary position.

9.   A block distortion detection apparatus as set forth

in claim 6, wherein:

said block boundary identification means retrieves

counter values of respective counters by following a

15   retrieving order of said plurality of counters and

rearranges the counter values in an ascending order; and

when each of said counters counts up when an edge

exists,

a difference of retrieving orders is "N" in two

20   counters having the largest and second largest counter

values, and

the second largest counter value is a predetermined

value or larger,

a horizontal position corresponding to said two

25   counters is identified as a block boundary position.

10.   A block distortion detection apparatus as set forth
in claim 6, wherein:

said block boundary identification means retrieves
counter values of respective counters by following a

5   retrieving order of said plurality of counters and
rearranges the counter values in an ascending order; and

when each of said counters counts down when an edge
exists,

a difference of retrieving orders is "N" in two

10   counters having the smallest and second smallest counter
values, and

the second smallest counter value is a
predetermined value or smaller,

a horizontal position corresponding to said two

15   counters is identified as a block boundary position.

11.   A block distortion detection apparatus as set forth
in claim 6, wherein:

said block boundary identification means retrieves
counter values of respective counters by following a

20   retrieving order of said plurality of counters and
rearranges the counter values in an ascending order; and

when each of said counters counts up when an edge
exists,

a difference of retrieving orders is "N" in two

25   counters having the largest and second largest counter

values, and

the second largest counter value is a predetermined

multiple of the third largest counter value,

a horizontal position corresponding to said two

5   counters is identified as a block boundary position.

12.   A block distortion detection apparatus as set forth

in claim 6, wherein:

said block boundary identification means retrieves

counter values of respective counters by following a

10 retrieving order of said plurality of counters and

rearranges the counter values in an ascending order; and

when each of said counters counts down when an edge

exists,

a difference of retrieving orders is "N" in two

15 counters having the smallest and second smallest counter

values, and

the second smallest counter value is a

predetermined multiple of the third smallest counter

value,

20   a horizontal position corresponding to said two

counters is identified as a block boundary position.

13.   A block distortion detection apparatus as set forth

in claim 6, wherein:

said block boundary identification means retrieves

25 counter values of respective counters by following a

retrieving order of said plurality of counters and

rearranges the counter values in an ascending order; and

when each of said counters counts up when an edge

exists,

5   a difference of retrieving orders is "N" in two

counters having the largest and second largest counter

values,

the second largest counter value is a predetermined

value or larger, and

10   the second largest counter value is a predetermined

multiple of the third largest counter value,

a horizontal position corresponding to said two

counters is identified as a block boundary position.

14.   A block distortion detection apparatus as set forth

15   in claim 6, wherein:

said block boundary identification means retrieves

counter values of respective counters by following a

retrieving order of said plurality of counters and

rearranges the counter values in an ascending order; and

20   when each of said counters counts down when an edge

exists,

a difference of retrieving orders is "N" in two

counters having the smallest and second smallest counter

values,

25   the second smallest counter value is a

predetermined value or smaller, and

the second smallest counter value is a

predetermined multiple of the third smallest counter

value,

5   a horizontal position corresponding to said two

counters is identified as a block boundary position.

15.   A block distortion detection method for detecting a

block distortion due to block encoding of an image,

including the steps of:

10   detecting an existence of an edge in each of a

plurality of pixel signals based on differences of said

plurality of successive pixel signals;

successively retrieving edge detection results of

said edge determination means respectively by a plurality

15 of counters in accordance with the number of pixels

included in a block at first timing in synchronization

with a horizontal synchronization signal and counting;

and

successively retrieving counter values of said

20 plurality of counters at second timing in synchronization

with a vertical synchronization signal and identifying as

a block boundary based on an order of retrieving the edge

detection results by the counters and a counter value of

the counters.

25 16.   A block distortion detection method for detecting a

block distortion due to block encoding of an image,

comprising:

an edge detection means for detecting an existence

of an edge in each of a plurality of pixel signals based

5   on differences of said plurality of successive pixel

signals;

an edge count means including a plurality of

counters in accordance with the number of pixels included

in a block, for successively retrieving edge detection

10   results of said edge determination means respectively by

said plurality of counters at first timing in

synchronization with a horizontal synchronization signal

and counting;

a block boundary identification means for

15   successively retrieving counter values of said plurality

of counters at second timing in synchronization with a

vertical synchronization signal and identifying as a

block boundary based on an order of retrieving the edge

detection results by the counters and a counter value of

20   the counters; and

a filtering means for performing filtering

processing on the pixel signals at the block boundary

position specified by said block boundary identification

means.